DIPLOMA EXAMINATION

CURRICULUM SPECIFICATIONS
for
MATHEMATICS 30

Alberta
EDUCATION
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MATHEMATICS 30 CURRICULUM SPECIFICATIONS

A. Program Elements

The Mathematics program is based on six elements: trigonometry; quadratic relations; sequences, series, limits; statistics; logarithms; and polynomial functions. The percentage emphasis of each component for instruction in Mathematics 30 is listed in the table below. Even though each component is listed separately, instruction should integrate these with the development of concepts. Not all these elements have equal emphasis at each course level. Hence, development of these components should take place as the concepts are presented.

Content	Emphasis
Trigonometry	25%
Quadratic Relations	22%
Sequences, Series, Limits	19%
Statistics	15%
Logarithms	9%
Polynomial Functions	10%

B. Priority Weightings

The following code is used in the specifications to indicate curriculum and instruction priority.

A = high priority
B = medium priority
C = low priority

MATHEMATICS 30 CURRICULUM SPECIFICATIONS

PROGRAM COMPONENTS

A. TRIGONOMETRY	25%

PRIO-RITY RATING		EMPHASIS IN PER CENT
C	1. Maintain previously developed skills.	25%
C	2. Describe circular paths using the initial point and directed distance of the path.	
C	3. Define the unit circle $x^2 + y^2 = 1$.	
C	4. Determine co-ordinates of points on the unit circle.	
A	5. Define the trigonometric ratios in terms of co-ordinates of points on the unit circle.	
B	6. Find the domain and range of the six trigonometric functions.	
A	7. Solve simple trigonometric equations.	
A	8. Given the value of one of the trigonometric ratios, evaluate the other five trigonometric ratios.	

PRIO-RITY RATING		EMPHASIS IN PER CENT
A	9. Derive and apply the following identities: a. Quotient relations: $\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cot \theta = \frac{\cos \theta}{\sin \theta}$ b. Reciprocal Relations: $\csc \theta = \frac{1}{\sin \theta}$ $\sec \theta = \frac{1}{\cos \theta}$ $\cot \theta = \frac{1}{\tan \theta}$ c. Pythagorean Relations: $\sin^2 \theta + \cos^2 \theta = 1$ $1 + \tan^2 \theta = \sec^2 \theta$ $1 + \cot^2 \theta = \csc^2 \theta$	Cont.
C A	10. Derive and apply the following identities: a. Negative Arc Formulas: $\sin(-\theta) = -\sin \theta$ $\cos(-\theta) = \cos \theta$ $\tan(-\theta) = -\tan \theta$ b. Sum Formulas: $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$	

PRIO-RITY RATING		EMPHASIS IN PER CENT
C	c. Complementary Arc Formulas: $\cos \frac{\pi}{2} - \theta = \sin \theta$ $\sin \frac{\pi}{2} - \theta = \cos \theta$	
C	11. Draw and identify the graphs of the sine, cosine and tangent functions.	
C	12. Define periodic function and state the periods of $\sin \theta$, $\cos \theta$, $\tan \theta$.	Cont.
C	13. Define radian measure.	
B	14. Convert degree measure to radian measure and vice versa.	
C	15. Determine exact values of trigonometric ratios of 0°, 30°, 45°, 60°, and 90°.	
B	16. Determine the value of a trigonometric ratio of any angle.	
A	17. Solve oblique triangles by using the sine law and/or cosine law.	
A	18. Apply the sine law and cosine law to practical problems.	
B	19. Solve problems involving area of regular polygons.	

B. QUADRATIC RELATIONS (CONIC SECTIONS) 22%

PRIORITY RATING		EMPHASIS IN PER CENT
C	1. Maintain previous skills in analytic geometry: a. linear functions and slope b. distance and midpoint formula c. properties of tangents from Math 20 d. solution of systems of equations in two variables	22%
C	2. State the definition of the circle and derive the standard form.	
B	3. Convert the equation of a circle from standard to general form.	
A	4. Determine the equation of a circle and sketch the graph given these conditions: a. centre and radius b. centre and a point c. centre and equation of tangent line d. three points on a circle e. two points and equation of line containing the centre	
C	5. Define and identify a parabola and the terms: focus, vertex, and axis.	
C	6. Derive the standard form of the equation of a parabola with horizontal or vertical axis of symmetry.	
A	7. Find the focus and directrix from the equation of a parabola.	

PRIO-RITY RATING		EMPHASIS IN PER CENT
A	8. Determine an equation and sketch the parabola given: a. focus and directrix b. vertex and directrix c. vertex and point on the parabola	
A	9. Solve applied problems related to the parabola.	
C	10. Define and identify an ellipse and the terms: foci, major axis, minor axis, vertices, and focal radii.	
C	11. Derive the standard form of the equation of an ellipse with foci on the x-axis or y-axis.	Cont.
A	12. Given the equation of the ellipse, determine: foci, vertices, major axis, and minor axis.	
C	13. Derive the relation between the parameters a, b and c for the ellipse. $(a^2 = b^2 + c^2)$	
A	14. Determine an equation and sketch the ellipse given: a. minor axis and distance between foci b. vertices and foci c. vertices and a point on ellipse	
A	15. Solve applied problems related to the ellipse.	
C	16. Define and identify a hyperbola and the terms: vertices, foci transverse axis, conjugate axis, and asymptotes.	

PRIO-RITY RATING		EMPHASIS IN PER CENT
C	17. Derive the standard form of the equation of a hyperbola with foci on the x-axis or the y-axis.	Cont.
A	18. From the equation of the hyperbola find the foci, vertices, transverse axis, conjugate axis, and asymptotes.	
C	19. Derive the relation between the parameters a, b, and c for the hyperbola. $(a^2 + b^2 = c^2)$	
A	20. Determine an equation and sketch the hyperbola given: a. transverse axis and conjugate axis b. foci and length of one axis c. equation of an asymptote and a point on the hyperbola	
A	21. Solve applied problems related to the hyperbola.	

C. SEQUENCES, SERIES, LIMITS — 19%

PRIORITY RATING		EMPHASIS IN PER CENT
C	1. Recognize the difference between: a. a sequence and a series b. finite and infinite sequences	19%
C	2. a. Recognize and define arithmetic sequences and series and state the common difference (d)	
	b. Derive and apply:	
A	i. the general term formula $a_n = a_1 + (n - 1)d$	
	ii. the sum formula $S_n = \frac{n}{2}(a_1 + a_n)$	
A	c. Apply formulas to problems involving arithmetic sequences and series.	
C	3. a. Recognize and define geometric sequences and series and state the common ratio (r)	
A	b. Derive and apply:	
	i. the general term formula $a_n = a_1 r^{n-1}$	
	ii. the sum formulas $S_n = \frac{a_1(r^{n-1})}{r - 1}, \; r \neq 1$ $S_n = \frac{ra_n - a_1}{r - 1}, \; r \neq 1$	
A	c. Apply formulas to problems involving geometric sequences and series, with special emphasis being given to the mathematics of finance:	

PRIO-RITY RATING		EMPHASIS IN PER CENT
A	i. Difference between and applications of simple and compound interest. ii. Use tables to determine accumulated and present value accounts involving compound interest over different time periods. iii. Illustrate the various annuities by using line diagrams. iv. Apply geometric series to both accumulated and present value annuities with both identical and differing interest and payment periods.	
B	4. Generate the terms of a series using sigma notation (Σ).	Cont.
B	5. Determine the limits of various functions.	
C	6. Recognize the differences between infinite convergent and divergent sequences.	
B	7. Find the limits of infinite convergent sequences.	
A	8. Find the sums of infinite convergent series.	
A	9. Solve problems involving infinite geometric series.	

D. STATISTICS — 15%

PRIORITY RATING		EMPHASIS IN PER CENT
C	1. Maintain previous skills. a. frequency distribution b. measures of central tendency c. measures of dispersion	
A	2. Illustrate and develop the normal distribution and *z*-scores.	15%
B	3. Develop and apply standard deviation.	
C	4. Introduce probability using an experimental approach.	
B	5. Apply probability to theoretical frequency distribution.	

E. LOGARITHMS 9%

PRIORITY RATING		EMPHASIS IN PER CENT
C	1. Maintain previous skills on exponents.	9%
B	2. Identify and graph exponential functions.	
B	3. Convert equation from exponential form to logarithmic form and vice-versa.	
A	4. Solve logarithmic equations by converting to exponential form.	
C	5. Define the inverse of an exponential function in logarithmic form.	
A	6. Evaluate expressions and solve equations involving logarithmic form and exponential form.	
B	7. State and use the basic laws or properties of logarithms, products, quotients, powers, and roots.	
B	8. Use logarithms to solve practical problems.	

F. POLYNOMIAL FUNCTIONS — 10%

PRIORITY RATING		EMPHASIS IN PER CENT
C	1. Maintain previous skills with polynomials.	
C	2. Classify a polynomial function according to degree.	
B	3. Define integral polynomial functions.	
C	4. Write polynomial functions (in descending order of degree) of the form. $f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + a_{n-1}x + a_n$, $a_0 \neq 0$, $n \in N$	10%
A	5. Divide integral polynomial functions in one variable by a binomial of the form $x - a$, $a \in I$ using long division and synthetic division.	
B	6. Evaluate integral polynomial functions for given values of the domain utilizing the Remainder Theorem.	
A	7. Find factors of integral polynomial functions using the Factor Theorem.	
A	8. Determine the x-intercepts of integral polynomial functions where $x \in Q$.	
A	9. Sketch the graph of the integral polynomial functions using the intercepts.	